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**A TILT ANGLE VARIABLE TYPE ANTENNA**

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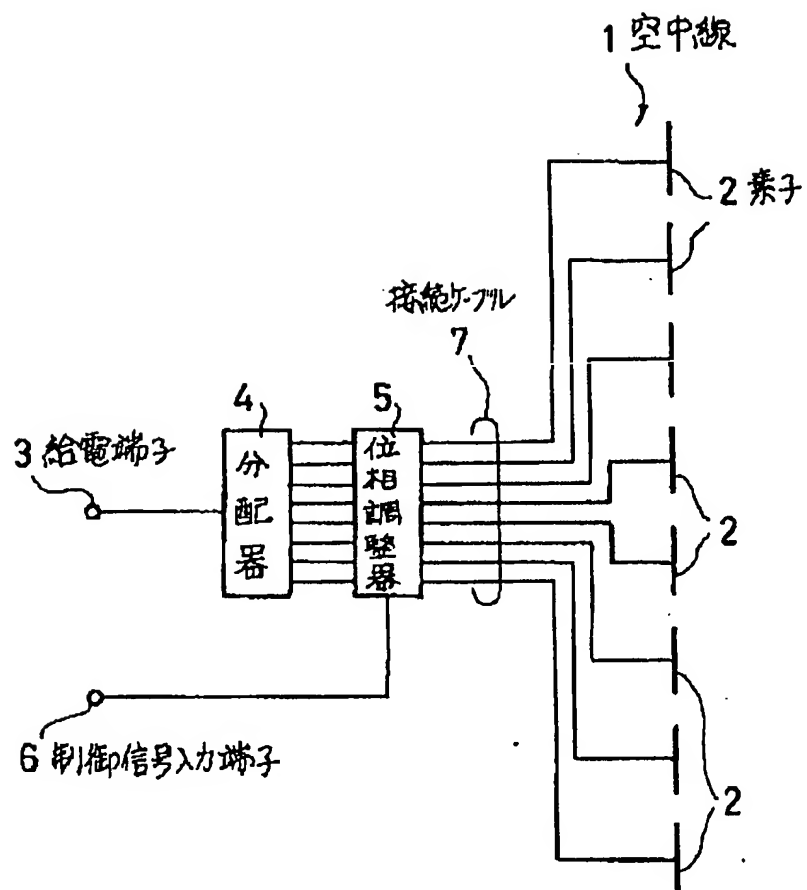
**Abstract:** PURPOSE: To easily adjust a tilt angle at site or at a remote location by interposing a phase adjustment device to a post-stage of a distributor for a high frequency signal so as to the number of adjust the phase.

CONSTITUTION: An antenna 1 consists of plural elements 2, a high frequency signal fed to the antenna 1 is inputted to a distributor 4 from a feeding terminal 3 and distributed to elements 2. A phase adjustment device 5 is connected to a post-stage of the distributor 4 and the phase of each high frequency signal distributed by the control signal inputted to a control signal input terminal 6 is individually adjusted. That is, since the phase of the high frequency signal fed to each element 2 is individually adjusted by the phase adjustment device 5, it is not required to adjust a change in the length of the connection cable 7 different from a conventional antenna to adjust a tilt angle of the antenna 1. Moreover, the tilt angle is adjusted by inputting a control signal from a remote location to manage easily the antenna 1.

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(54)[Name of invention] Tilt Angle Adjustable Antenna

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(57)[Abstract]

[Subject] Offering to easily adjustable controlling of the tilt angle of the antenna at the antenna site or from long distance.

[Structure] Incorporate Phase Controller 5 between Divider 4 and Antenna 1 to distributing signals into the plural number of Antenna Elements 2. The Phase Controller shall adjust the phase of signals to be supplied to the individual antenna element respectively that shall be able to adjust the tilt angle of antenna 1. This phase controller can be operated by the control signal to be supplied to the Control Signal Input Terminal 6. that Phase Controller can be installed at the Antenna site as well as at other place in long distance.

[Area of Patent Claims]

[Claim 1] The Antenna with the features of the Tilt Angle Adjustable by the phase controller to be located between Divider and Antenna that is consisting of the plural antenna elements which are having the signals with supplying by the individually divided by the divider through phase controller,

[Claim 2] The antenna per Claim 1 that is having the phase controller that is adjusting phase by the control signal to be supplied to control signal terminal.

**[Details of the Invention]**

[0001]

**[Technical Area of Invention]** This invention is concerning to the antenna to be used for mobile communication. Especially, the antenna that its tilt angle can be adjusted.

[0002]

**[Current Technology]** Currently, there are antennas containing plural antenna elements inside to be used for mobile communication. Those high frequency signals are supplying after dividing for the numbers of antenna element by the divider that are supplying to the antenna elements by the connection cables respectively. This kind of antenna requires adjustment of the tilt angle of the antenna for obtaining maximum performance for covering the service area. Therefore, adjust phase for tilt angle of entire antenna by the adjustment of these phases between each antenna element with implemented by the changing of the length of connection cables.

[0003]

**[The Subject of Solving by Invention]** It is difficult to the adjustment of the tilt angle of the antenna under current type at the antenna site after installation due to requirement of the adjustment of plural connection cables for adjustment. Accordingly, the optimization of mobile communication system for procurement of suitable service area is going to be difficult due to the difficulty of the adjustment of the tilt angle. The subject of solving by this invention is that offer antenna with easy adjustable tilt angle antenna at the antenna site or distance location.

[0004]

**[Solving Method of the Subject]** The antenna under this invention has the phase controller after divider for distributing signals to plural antenna elements that construct the phase to be supplied to the antenna elements individually adjustable. Also, the phase controller can be controlled and adjusted phases by the signal to be applied to the phase control signal input terminal.

[0005]

**[Function]** Under this invention, the tilt angle of the antenna can be adjusted by the adjustments of the phase to be applied to the antenna elements through phase controller. Also, the phase controller can be controlled and adjusted phases by the control signal through control signal input terminal at distance location.

[0006]

**[Operation Example]** Fig. 1 is perspective diagram as a example of the invention. The antenna 1 is consists by the plural antenna elements 2. The signal supplied to the antenna 1 is supplied from input connector 3 of antenna 1 to the divider 4. Then, the signal is divided to meet to the number of the antenna element. There is a phase controller 5 after divider, and individual signal is phase adjusted respectively by the control signal through control signal input terminal 6. Then, the phase adjusted signal shall be supplied to the antenna elements 2 respectively by the connection cables 7.

[0007] Under this structure, the phases supplied to the antenna elements 2 can be adjusted respectively by the adjustment of the plural signals that are divided by divider 4 through phase controller 5 that is controlled by the control signal supplied to the control signal input terminal of phase controller. By this method, the tilt angle of the antenna 1 can be adjusted without adjustment of the length of the connection cable 7 to be connected to each antenna elements 2. Accordingly, the suitable service area of the antenna 1 can be procured even after installation antenna 1 to the antenna site due to adjustable tilt angle of antenna 1.

[0008] The control signal to the control signal input terminal 6 can be remote controlled from distance location. The antenna signal to the antenna elements can be controlled respectively via phase controller that is controlled by the control signal through phase controller 5. The antenna tilt angle can be remote controlled from distance location accordingly.

[0009]

**[Effectiveness of the Invention]**

As described, this invention shall adjust the phase of the signal to be supplied to the each antenna elements through phase controller. Under this method, the tilt angle of the antenna can be adjusted easily even after antenna installation that shall procure suitable service area. Also, it shall be controlled even from distance location that shall eliminate adjustment at the antenna site that shall maintain management of the antenna easily. This method shall eliminate works of adjustment at the antenna site.

**[Simple Explanation of the Drawings]**

[Fig. 1] Block diagram of this invention.

**[Explanation of the Symbol]**

- 1     Antenna
- 2     Antenna Element
- 3     Input Connector
- 4     Divider
- 5     Phase Controller
- 6     Control Signal Input Terminal
- 7     Connection Cable